

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND TECHNOLOGY RESUME

TITLE

Infrared Imaging of Comets

PERFORMING ORGANIZATION

NASA George C. Marshall Space Flight Center
Huntsville, AL 35812

INVESTIGATOR'S NAME

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DESCRIPTION (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)

a. Strategy: Thermal infrared imaging of comets provides fundamental information about the distribution of dust in their comae and tails. Our imaging program at NASA MSFC uses a unique 20-pixel bolometer array that we have developed to image comets at 8-30 μm . These images provide the basis for (i) characterizing the composition and size distribution of the particles, (ii) determining the mass-loss rates from cometary nuclei, and (iii) describing the dynamics of the interaction between the dust and the solar radiation.

b. Accomplishments: Since our array became operational in 1985 we have produced at the Wyoming Infrared Observatory and the NASA Infrared Telescope Facility a unique series of IR images of comets Giacobini-Zinner (GZ), Halley, and Wilson. That of GZ was the first groundbased thermal image ever made of a comet and was used to construct, with visible observations, an albedo map. Those data and dynamical analyses showed that GZ contained a population of large ($\sim 200 \mu\text{m}$), fluffy dust grains that formed a distinct inner tail. The accumulating body of images of various comets has also provided a basis for fruitfully intercomparing comet properties. For example, GZ and Halley were observed, at identical earth-comet-sun geometries, to have very different appearances, implying important differences in the dust size distributions. We have also taken advantage of the unique capabilities of our camera to resolve the inner, possible proto-planetary, disk of the star β Pictoris; while not a comet research program, that study is a fruitful additional application of our array to solar system astronomy.

c. Anticipated Accomplishments: We are currently involved in further detailed modelling of the dust distributions in comets using dynamical analyses developed through extensive collaboration. We are also continuing our regular program of 8-30 μm imaging, with the comet Tempel 2 being our primary object for the fall of 1988.

d. Publications

Campins, H., Telesco, C. M., Decher, R., and Ramsey, E. D.: Thermal Infrared Imaging of Comet P/Halley. *Astron. Astrophys.* 187, 601, 1987.

Decher, R., Telesco, C. M., Golisch, W. F., Campins, H.: Comet P/Tempel 2. *IAU Circular* 4580, 1988.

Hammel, H. B., Telesco, C. M., Campins, H., Decher, R., Storrs, A. D., Cruikshank, D. P.: Albedo Maps of Comets P/Halley and P/Giacobini-Zinner. *Astron. Astrophys.* 187, 695, 1987.

Telesco, C. M., Becklin, E. E., Woistencroft, R. D., and Decher, R.: Resolution of the Circumstellar Disk of β Pictoris at 10 and 20 μ m. *Nature* (in press).

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